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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/800,014	03/15/2004	Jianfang Zhang	2584-3	6809
23117 7590 01/26/2007 NIXON & VANDERHYE, PC 901 NORTH GLEBE ROAD, 11TH FLOOR ARLINGTON, VA 22203			EXAMINER SINGH, PREM C	
			ART UNIT	PAPER NUMBER
			1764	
SHORTENED STATUTORY PERIOD OF RESPONSE		MAIL DATE	DELIVERY MODE	
3 MONTHS		01/26/2007	PAPER	

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/800,014

Applicant(s)

ZHANG ET AL.

Examiner

Prem C. Singh

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 December 2006.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 7 is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 December 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

Drawings

The new drawings are noted.

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character (26) for “catalyst buffer tank” and “second settler” (6) are not shown in figure 3.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner,

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the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Rejection of claim 7 under 35 USC § 103(a) is withdrawn.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was

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not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bhattacharyya et al (US Patent 7,029,571).

Claim 1.

Bhattacharyya discloses, "A multistage selective catalytic cracking process comprising the steps of: (i) contacting preheated feed with a mixed catalyst in a first riser reactor under catalytic cracking conditions to obtain first cracked hydrocarbon products; (ii) separating the cracked hydrocarbon products; (iii) cracking the second fraction from the first riser reactor to obtain second cracked hydrocarbon products; (iv) separating the catalytically cracked products from the second riser reactor along with cracked products from the first riser reactor in a main fractionating column to yield cracked products comprising dry gas, LPG, gasoline, middle distillates, heavy cycle oil, and slurry oil; (v) recycling the entire heavy cycle oil into the second riser reactor; (vi) optionally, recycling the fraction of unconverted hydrocarbons obtained in step (v) in riser reactor(s)." (Column 4, lines 4-56). "It is pertinent to note that in practice, riser reactors of any desired number may be functionally attached downstream of the second riser reactor." (Column 7, lines 55-57). The residence time in the riser reactors is 1-8 second (Column 8, lines 40-41). "The spent catalyst is then passed through a common

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or separate stripping section. Stripped catalyst is then passed to a common dense or turbulent fluidized bed regenerator. A part of the regenerated catalyst is directly circulated to the second riser reactor." (Column 9, lines 18-28). Bhattacharyya further discloses, "Gas oil is cracked in the first riser in the presence of aforesaid catalyst mixture. The heavy naphtha product from the first riser and/or virgin straight run naphtha are cracked in the second riser in the presence of catalyst mixture to produce high octane gasoline together with C₃ and C₄ olefins." (Column 2, lines 60-65).

Although Bhattacharyya uses two riser reactors in the embodiment, the invention does suggest using third riser reactor, and therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify Bhattacharyya invention and recycle a part of the gasoline/middle distillate fraction from the fractionating column to the third riser reactor to increase the production of high octane gasoline and C₃ and C₄ olefins.

Claims 2 and 3.

Bhattacharyya uses cracking catalysts A, B, C, D, and E (Table 7, column 14; Table 10, column 16). Bhattacharyya also discloses, "Both the first and second stage risers are charged with the same catalyst." (Column 12, lines 13-14). Although Bhattacharyya does not specifically mention using different catalysts in the three risers, it would have been obvious to one skilled in the art at the time the invention was made to modify Bhattacharyya invention and use different catalysts in the three risers because

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all the mentioned cracking catalysts (A through E) are expected to give equivalent performance in the cracking operation and make the process more flexible.

Claim 4.

As mentioned under claims 2 and 3, Bhattacharyya uses the same catalyst in all the three risers. Also Bhattacharyya discloses, "The basic objective of this invention is to maximize the yield of light olefins." (Column 3, lines 15-17). Clearly, Bhattacharyya suggests using different catalysts for different end products.

Claims 5-6.

Bhattacharyya discloses all the steps including, contacting the hot regenerated catalyst with the incoming feed in the first riser reactor, separating the cracked products, recycling the separated heavy product to the second riser reactor, stripping the catalyst, regenerating, and recycling to the riser reactor (Column 6, lines 46-67; column 7, lines 1-45). Bhattacharyya also discloses, as mentioned under claim 1, separating cracked gases, LPG, and gasoline from the distillation column.

Although Bhattacharyya mentions using only two risers, the invention does suggest using the third riser and as discussed under claim 1, it would have been obvious to one skilled in the art at the time the invention was made to modify Bhattacharyya invention and recycle a part of the cracked gases including LPG, gasoline, and middle distillate fraction from the fractionating column to the third riser reactor to increase the production of high octane gasoline and C₃ and C₄ olefins.

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Although Bhattacharyya does not specifically mention first, second, and third catalyst regeneration and recycle system, figure 2 of the invention shows two risers (1 and 2) (and suggests three risers), a regenerator (7), and recycle loops (9, 2) and (8, 19, 1), thus, it would have been obvious to one skilled in the art at the time the invention was made to modify Bhattacharyya invention and claim catalyst regeneration and recycle systems for proper control of the entire cracking process.

Allowable Subject Matter

Claim 7 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

A catalytic cracking process according to claim 1 with third riser as a descending reactor having a catalyst transfer and coke burning conduit and with limitations as claimed in claim 7 are not taught or fairly suggested in the prior art.

Response to Arguments

The Applicant argues that specifically, the cited patent is understood to disclose a process of catalytic cracking of multiple riser for producing high yield of middle

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distillates, i.e. the middle distillates of C8 to C24. The claims require only two risers to achieve the recited aim. However, the present invention explicitly discloses a catalytic cracking process with three risers, thereby achieving the different production aims and satisfying the different requirements: for example increasing the yield of total liquid and simultaneously realizing upgrading of catalytic gasoline, and obtaining high quality of gasoline and diesel oil while producing more low olefins.

The Applicant's argument is not persuasive because the cited patent claims (Claim 18) more than two risers to obtain additional middle distillate products (See column 23, lines 62-67).

The Applicant argues that the process parameters are not believed to be consistent between the cited patent and the present invention in that the patent is understood to disclose that the contact period of oil and gas is 1 to 8 seconds, the riser top temperature is 400 to 525°C and the catalyst to oil ratio is 2 to 12. It is impractical and very difficult to carry out the operating conditions of the patent which varies in so large a scope to achieve the same production aim, i.e. producing more middle distillates in terms of the reaction principle of catalytic cracking.

The Applicant's argument is not persuasive because the claim requires a contact time of less than about 1.5 second and the patent discloses 1-8 seconds. Catalyst to oil ratio and temperature used in the cited reference are typical of a catalytic cracking (it is to be noted that the two parameters have not been claimed by the Applicant). The cited reference produces substantially pure middle distillate products ranging from 50 to 65 wt% of the fresh feed into the first riser (See column 4, lines 45-56).

The Applicant argues that the flow process of the present claims would not have been obvious in view of the cited patent. The patent discloses a reaction-regeneration system containing two riser reactors, wherein a fraction of unconverted heavy oil and cycle oil of greater than 370°C is further cracked in order to produce more middle distillates. A catalytic cracking process of three risers and the method to achieve the process or the flow are not mentioned or suggested.

The Applicant's argument is not persuasive because as per claim 18 of the patent, the charge stock goes to the additional riser reactors, by repeating steps (iii) to (iv). It is to be noted that steps (iii) and (iv) (of claim 1 of the patent) involve regeneration of the catalyst and separation of the products (See column 23, lines 62-67).

The Applicant argues that the use of the catalyst is also different between the process of the cited patent and the present invention. The cited patent discloses an ultra-stable zeolite catalyst for cracking heavy oil and is not believed to mention or suggest other functional catalysts.

The Applicant's argument is not persuasive because the patent discloses, "The catalyst comprises Y-zeolite in rare earth ultra-stabilized form. Bottom cracking components consisting of peptized alumina, acidic silica alumina, or gamma alumina are also added to the catalyst formulation to produce synergistic effects towards maximum middle distillate production." (Column 12, lines 6-14). The patent also discloses production of different product distribution by choosing the catalyst and the operating conditions, "Most of the prior art methods have concentrated on multiple riser

catalytic cracking for maximization of gasoline yields and its octane numbers, increased yield of iso-olefins for production of ethers, increased yield of light olefins, etc.” (Column 3, lines 19-23).

The Applicant argues that the cited patent is understood to only disclose a process for olefin-reduction modification of catalytic oil with high content of olefins by using the second riser. The process, the principle and the production aim of the cited patent are understood to be different from the presently claimed invention.

The Applicant's argument is not persuasive because the process, the principle and the production aim of the cited patent are similar to the Applicant's claims.

The Applicant argues that the presently claimed invention would not have been obvious from the cited art as the applicants believe that the flow process, the optimizing of operating conditions, the structure of the reactor, the control of reaction time and/or the choice of catalyst are all different and distinct.

The Applicant's argument is not persuasive because flow process in the prior art is similar to the Applicant's. The patent is using operating conditions typical in a FCC process. The difference in the structure of the reactor (descending riser reactor) is a part of the claim 7 (third riser only) and discussed in the Office action. First and second riser reactors are ascending type in the patent and also in the Applicant's claim. Contact time disclosed by the patent is between 1 and 8 second against the Applicant's claim of less than about 1.5 second. The patent is using commercially available FCC catalyst

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(See column 14, lines 13-15; column 15, lines 11-14) and the Applicant's claim (Claim 4) needs "conventional catalytic cracking catalyst".

The Applicant argues that the present invention explicitly discloses a catalytic cracking process of three risers and three flow processes to achieve different production aims. With regard to operating conditions and control of reaction time, the present invention discloses different operating conditions and reaction time, especially control of reaction time in accordance with different production aims.

The Applicant's argument is not persuasive because the cited prior art discloses a catalytic cracking process with two risers with further suggestion for the third riser. The first two risers use a common regenerator in the prior art similar to the Applicant's claims. The prior art suggests using a third riser but does not specifically mention about regeneration. Thus, it would have been obvious to one skilled in the art at the time the invention was made to modify Bhattacharyya invention and add a third riser with its separate regeneration system to produce high quality middle distillates.

Conclusion


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Prem C. Singh whose telephone number is 571-272-6381. The examiner can normally be reached on MF 8:00 AM-5:00 PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on 571-272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

PS/011607



Glenn Caldarola
Supervisory Patent Examiner
Technology Center 1700